



## Student Does His Part to Keep Eye Doctors Safe

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Inspired by stories of health care workers in dire need of personal protective equipment (PPE), Bishop's School sophomore Justin Korn decided to join the battle against COVID-19.

Justin's father, **Bobby Korn, MD, PhD**, Professor of Ophthalmology at the UC San Diego Shiley Eye Institute, recounted the story of Dr. Li Wenliang. He was an ophthalmologist and one of the first physicians in China to sound the alarm about this novel viral illness spreading throughout his country. Unfortunately, he succumbed to the disease at the young age of 33. Justin began to question his father about why eye doctors in particular are at high risk. Dr. Korn explained that the procedures of performing eye exams and treatments are in close proximity to patients.

Simultaneously, Dr. Korn was discussing the same issue with **David Granet, MD**, Professor and Director of the Ratner Children's Eye Center. Both observed that the standard face shields worn across the forehead do not allow ophthalmologists to carefully examine the retina or to check the refractive state of children's eyes in a safe manner. One can wear an N95 mask but then cannot use the specialized equipment that eye doctors utilize everyday and still protect the eyes and face from aerosolization of the virus. Justin overheard the conversation and took up the challenge!



*Justin Korn studying an indirect ophthalmoscope and a standard face shield*

Justin's first challenge was to design a safeguard that would integrate a face shield with an indirect ophthalmoscope (the microscope that allows visualization of the structures inside the eye) that is already mounted around the forehead. At this time, there is no commercially available face shield that will couple with an indirect ophthalmoscope. One can wear a standard face shield but that can't be used simultaneously with an indirect, especially if one wears glasses.

Justin took measurements of the device and designed a prototype on a 3D modeling program. Within a few hours, he created a working model from his 3D printer. The first designs were too flimsy and didn't provide enough side protection so he went back to the drawing board and came up with several new iterations. He finally settled on a model that could be quickly produced and hold up to the stresses of daily clinical use. Justin then spent every waking hour printing as many indirect ophthalmoscope shields as he could.



*Dr. Doran Spencer wearing Justin's customized indirect ophthalmoscope shield.  
Left to right: Bobby Korn, MD, PhD, Justin Korn, Doran Spencer, MD, PhD, and Darren Knight, MD*

Shortly after delivering shields to the Shiley Eye Institute, Justin was contacted by **Shira Robbins, MD**, Professor of Ophthalmology at the Ratner Children's Eye Center. Dr. Robbins asked Justin to create a specialized facial shield for a device she uses to check the refractive state of children's eyes (whether glasses are needed). This handheld device, known as a retinoscope, is used in close proximity to a child's eyes and this distance poses risks for the patient and doctor. Again, Justin went back to his design lab and fabricated a new model on his 3D printer. In just a few days, he had produced enough for the Ratner Children's Eye Center.



*Dr. Shira Robbins performing retinoscopy using Justin's facial shield*

Justin has since produced ophthalmic shields for doctors at the VA San Diego Health Care System and has made his designs freely available at the National Institute of Health (NIH) 3D Print Exchange ([3dprint.nih.gov](http://3dprint.nih.gov)). The FDA has authorized the use of 3D printed face shields under the Emergency Use Authorization (EUA).

*If you are an ophthalmologist or optometrist and are interested in getting one of Justin's free face shields or would like more information on the **Shiley Eye Institute and Viterbi Family Department of Ophthalmology**, please contact Karen Anisko Ryan at [kanisko@health.ucsd.edu](mailto:kanisko@health.ucsd.edu).*